FUTURE COMBAT SYSTEMS

FCS

One Team-The Army/Defense/Industry

ADVANCE PLANNING BRIEFING FOR INDUSTRY (APBI)/SMALL BUSINESS (SB) CONFERENCE

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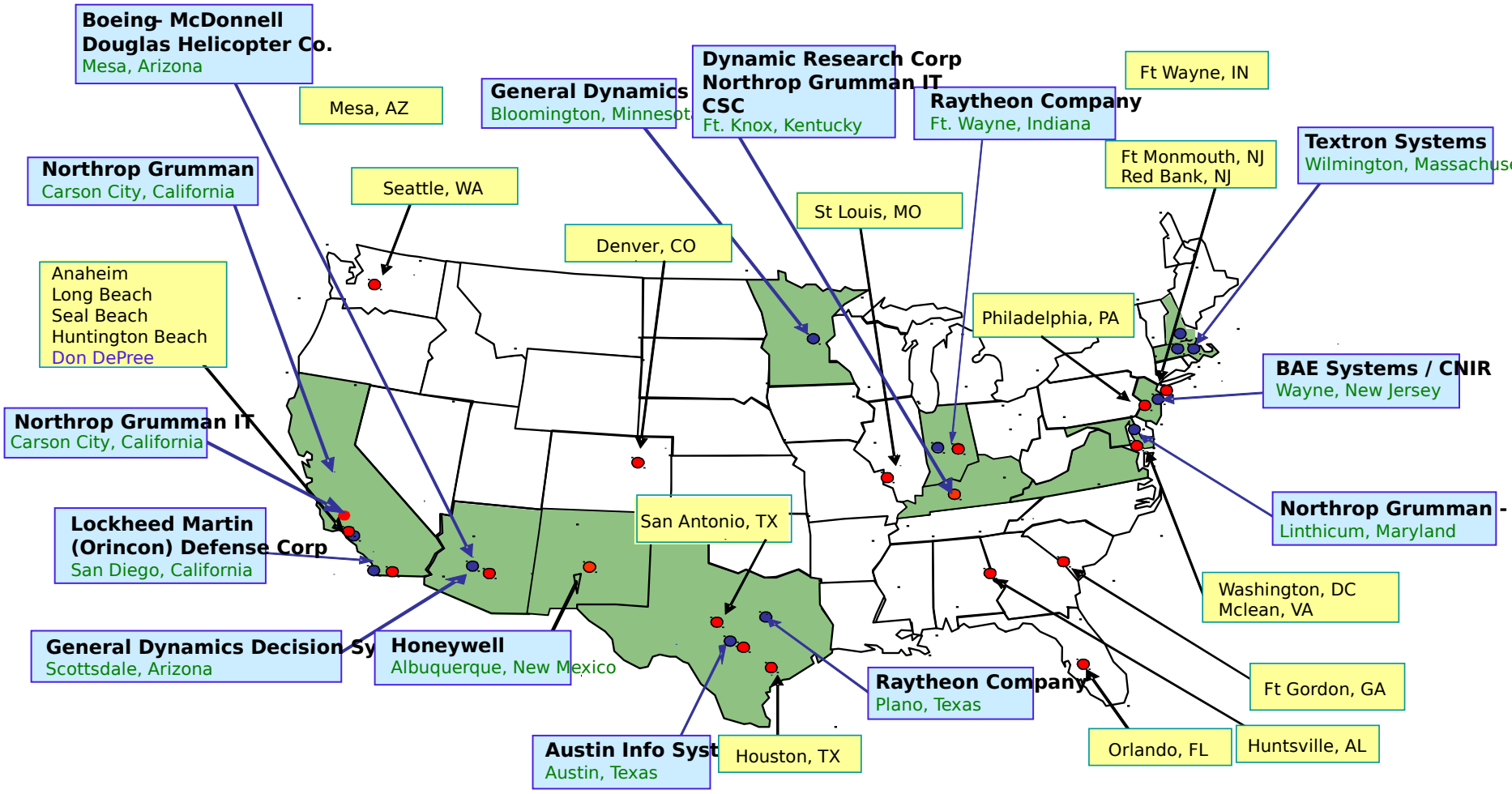
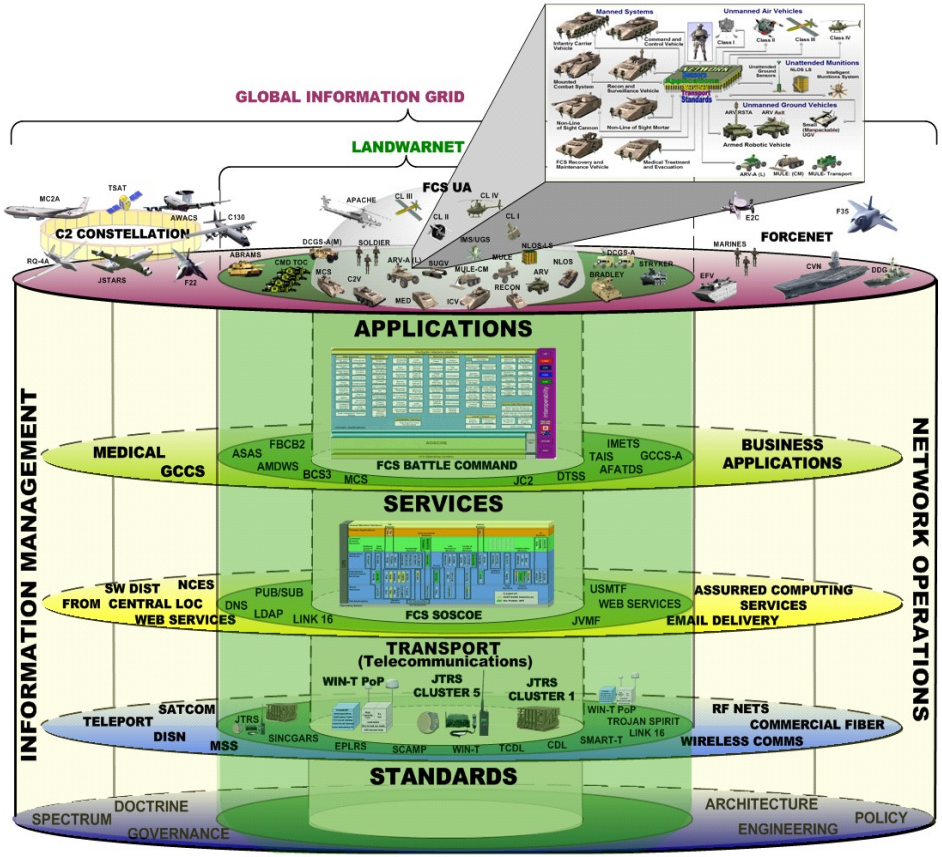
FCS LSI and Subcontractors



FCS Network Overview

The UA Integrates With Army Enterprise System Into the GIG



Integrated Warfighting Platforms: Lethality /Survivability enhanced by underlying network layers. Sensing systems: motion, visual, audible etc. ISR: Eyes and Ears of the Commander

BC Applications: assimilate info BC: C2 logic and reasoning based on information

System Services: Common Net-Centric Infrastructure SOSCOE: Tactical Net Centric Middleware

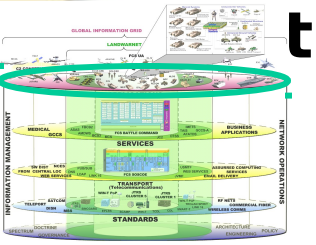
Transport Systems: Networked communications Networked Communications: Comms backbone and Ommssubnets from GIG to/from ground sensors

Standards: Common Net-Centric technical stand Includes DoD guidance, policy, and direction

FCS Program Significant Technologies

Software Programmable Radio
Interface and Information Exchange
Security Systems and Algorithms
Mobile Ad Hoc Networking Protocols
Quality of Service Algorithms
Unmanned Systems Relay
Wideband Waveforms
Advanced Man-Machine Interfaces
Combat Identification
Rapid Battlespace Deconfliction
Sensor Data Fusion & Data Compression
Dynamic Sensor-Shooter Pairing and Fire Control
LOS-BLOS-NLOS Precision Munition
Aided-Automatic Target Recognition
Recoil Management and Lightweight Components (LW Cannon)
Distributive Collaboration
Rapid Battle Damage Assessment
High Power Density Fuel Efficient Propulsion
Embedded Predictive Logistics
Water Generation
Tactical Engagement Simulation
Active Protection System
Signature Management
Lightweight Hull and Vehicle Armor
Power Distribution and Control
High Density Packaged Power
Class 1 UAV Propulsion Technology

Sensor Data Distribution
telligence Surveillance Reconnaissance



Tailored COP

BN

ISC

Tailored COP

NCIE

DCGS-A Functionality

Tailored COP

Pub/Sub

PLT/CO

NCIE

Report one to many

Scouts

DCGS-A Functionality

Pub/Sub

Pub/Sub

UE/Reach

Pub/Sub

NCIE

Report one to many

Pub/Sub

BCT

Mobile DCGS-A

NCIE

ISC/BICC

Class II

DCGS-A

F&EC

Report one to many

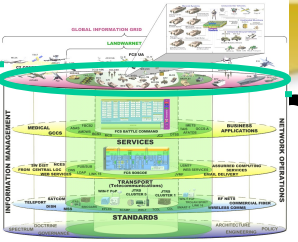
Tailored COP

Class IVa

Threat

CECOM — PEO-C3T — PEO-IEW&S — PEO-EIS — CERDEC

COMMUNICATIONS ELECTRONICS LIFECYCLE MANAGEMENT COMMAND



reas Where Industry Could Benefit ISR Layer

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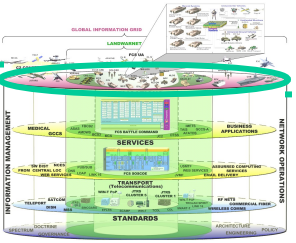
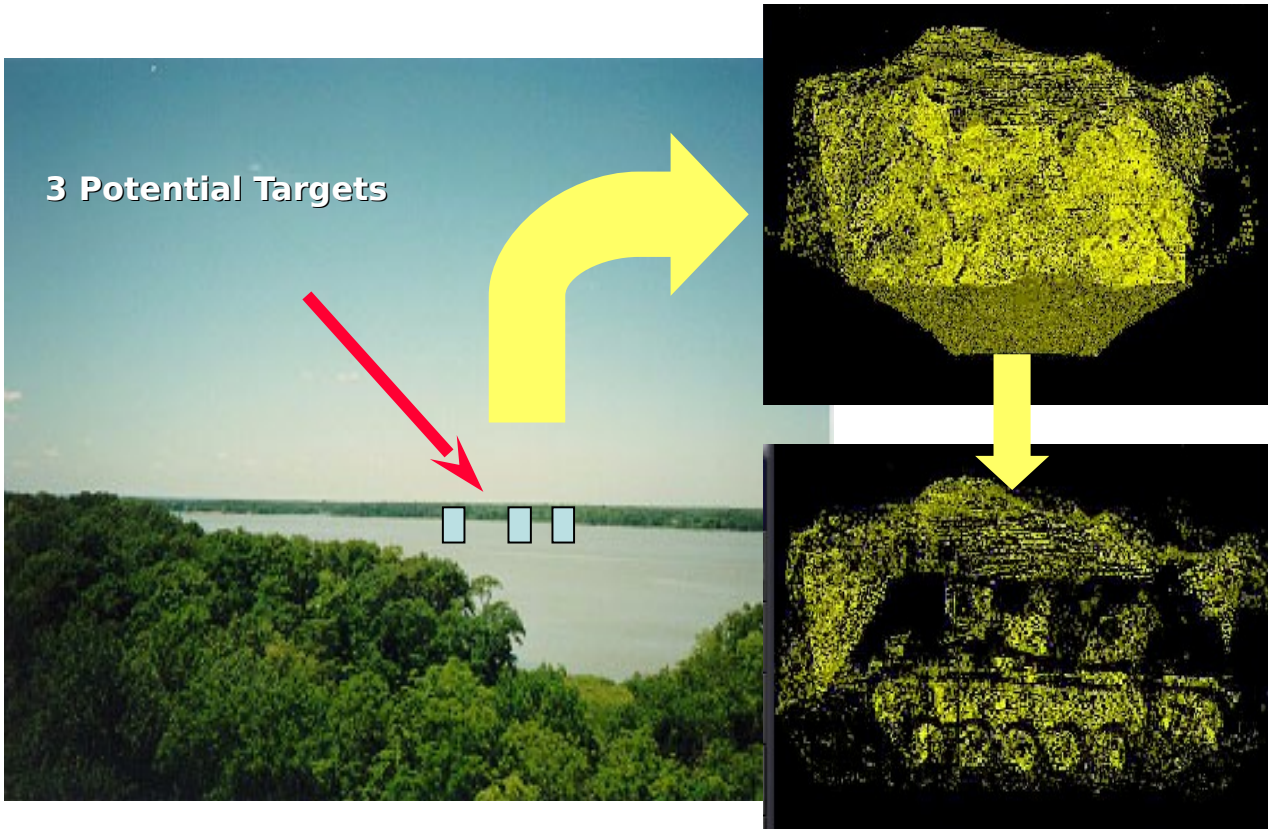
Foliage Penetrating Target - FOLPEN TGT Detection
Sense through the wall target detection
Detection of buried and surface mines on-the-move at increased speeds
Aided Target Recognition (AiTR) algorithms with decreased false alarm rates
Detection of minefields from survivable altitudes
Multi-spectral imaging for ground platforms
Detection of Improvised Explosive Device (IEDs) from Air and Ground Platforms.
3D Ladar Systems for UAVs with associated ATR
Detection of bio hazards in sensor packages that can be installed in FCS air and ground platforms

Multi-spectral, multi-feature and multi-perspective Automatic Target Recognition (ATR) algorithms
Low cost and reliable approaches for combat ID from different platforms to different platforms and soldiers
Direction finding in the presence of Multi-path
Conformal broadband antennas for Emitter Mapping systems for FCS emitter mapping platforms
Higher sensitivity and shorter response time uncooled Infrared (IR) sensors
Laser vibrometry for Battle Damage Assessment (BDA)
Lightweight pointing & stabilization systems for UAV
Hyperspectral sensing capability for

Areas Where Industry Could Benefit
UA
ISR Layer



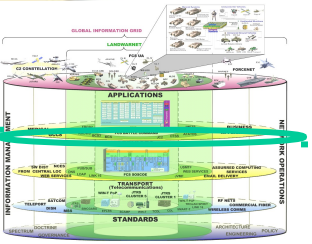
Foliage Penetrating Target - FOPEN TGT Detection



Battle Command Evolution

TEAM C4ISR FORT MONMOUTH, NJ

FUTURE COMBAT SYSTEMS FCS One Team-The Army/Defense/Industry

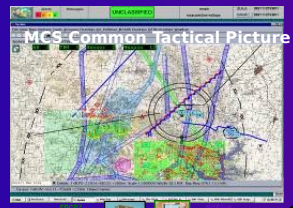


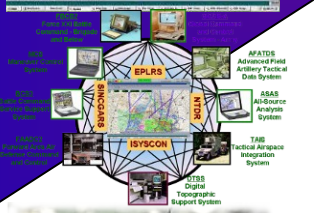
- *Integrated C2, Sustainment and Trai*
- *Unprecedented Knowledge Managem*
- *Squad to UA Real-Time Collaboration*
- *Common WF Display Interface*
- *Seamless Embedded Training*

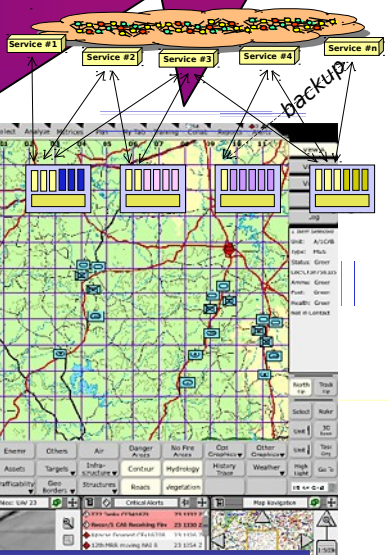
- *Joint Tactical Enterprise*
- *(Near) Real Time Battle View from Tip of Spear to TOC*

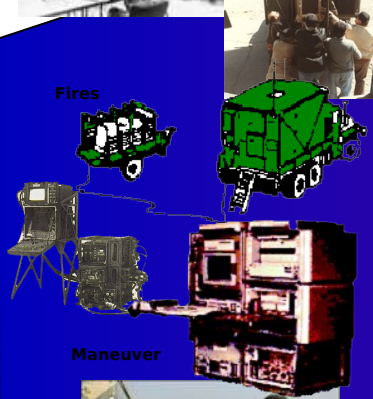
- *Integrated System of Systems*
- *Digitally-Shared Tactical Picture*

- *BFA Stovepipes*
- *Voice & Paper Exchange*









Work/Train as you Fight

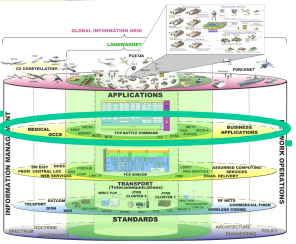
Desert Storm

'90s Battle Command Digitization

OEF/OIF

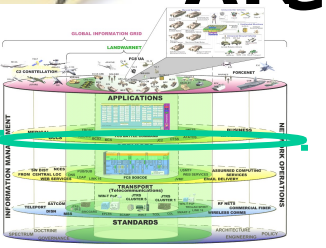
FCS UA BC

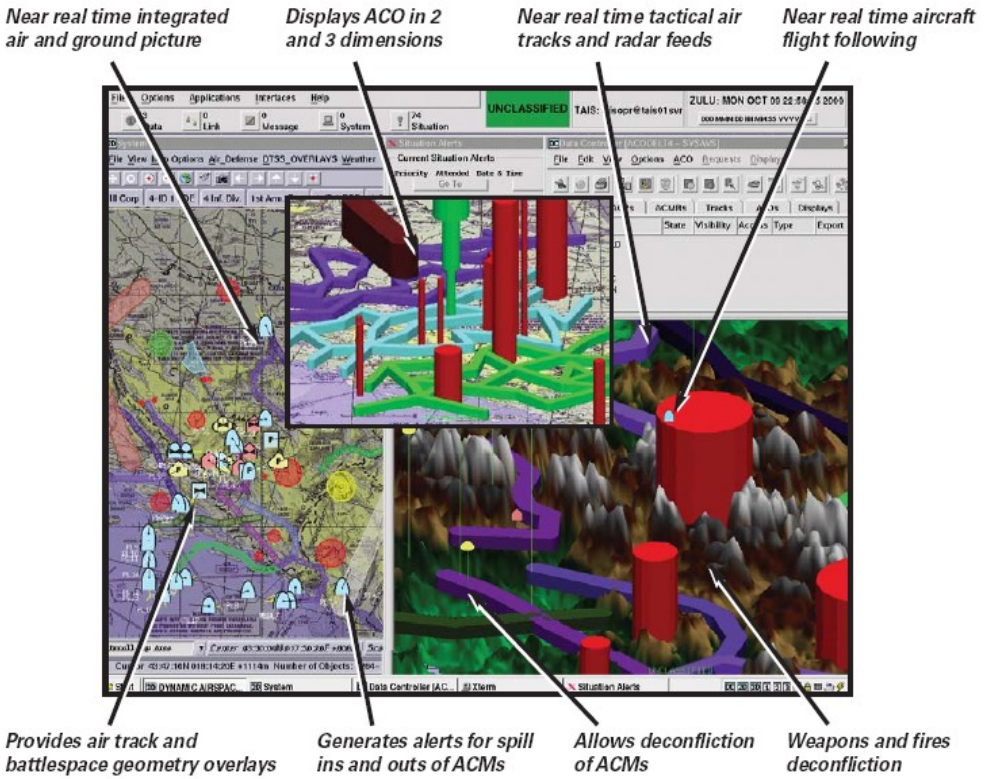
Areas Where Industry Could Benefit
Applications Layer



Rapid Battle Deconfliction
Rapid Battle Damage Assessment
Sensor Data Fusion and Data Compression

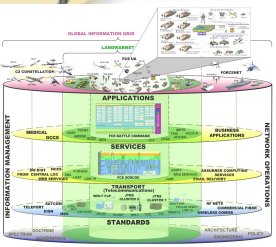
Areas Where Industry Could Benefit
Applications Layer




Near real time integrated air and ground picture
Displays ACO in 2 and 3 dimensions
Near real time tactical air tracks and radar feeds
Near real time aircraft flight following
Provides air track and battlespace geometry overlays
Generates alerts for spill ins and outs of ACMs
Allows deconfliction of ACMs
Weapons and fires deconfliction

- **Real Time**
- **3D Deconfliction**
  - **Air**
  - **Ground**

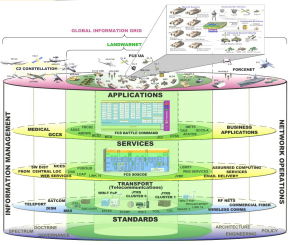
Information Assurance (IA)



- Platforms/Soldiers susceptible to physical attack / capture
- Trusted Insider
- Malicious code in COTS/OS products
- Global connectivity
- Commercial Internet standards
- Dependent on network-hosted services
- Attacks at the protocol
- Attacks at the waveform

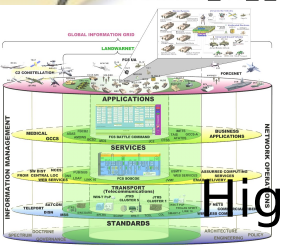
Defense In Depth paradigm is distributed across all layers of the Network and implemented from the GIG to the Soldier

Areas Where Industry Could Benefit IA



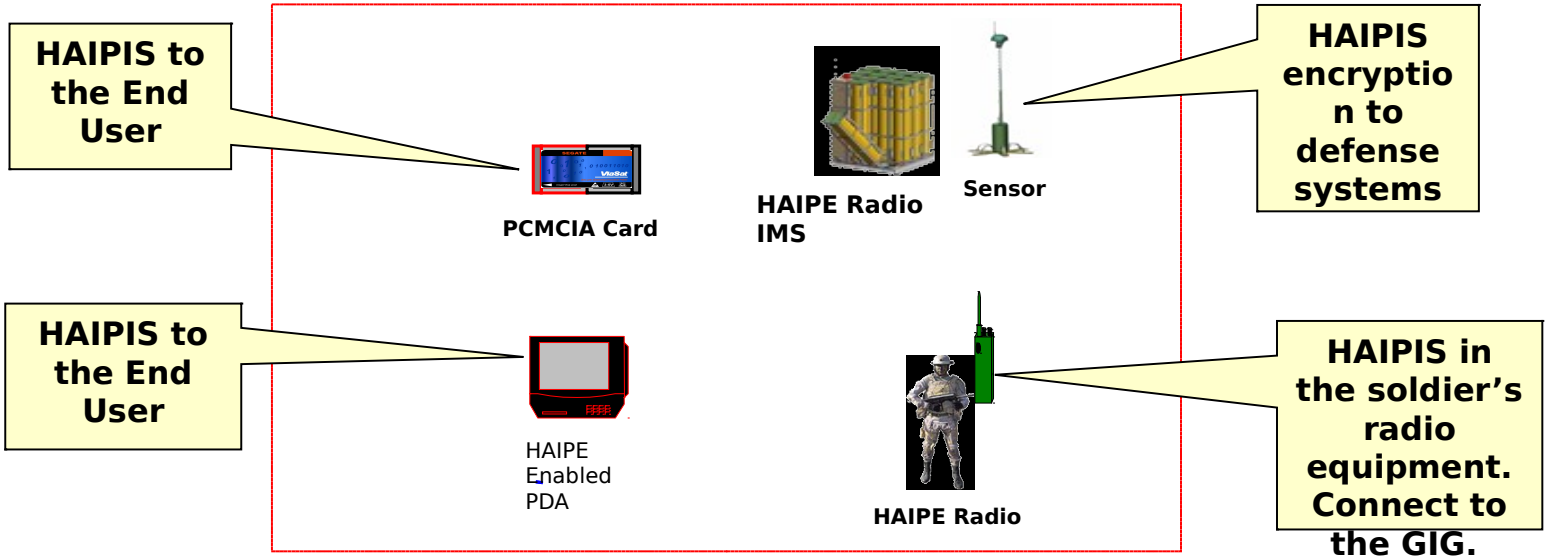
Encryption
Cross Domain Guard
Cross Domain Solution
Firewall
Intrusion Detection Systems
Intrusion Protection Systems
Malicious Code Detection
Hardware certificate tokens to support tactical PKI

Areas Where Industry Could Benefit UA IA

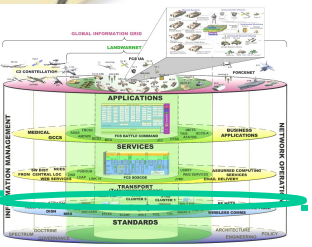


High Assurance Internet Protocol Encryption (HAIPE) devices that Require less Size, Weight & Power (SWaP)

- Automated keying (i.e. Over The Network Keying)
- HAIPIS 3.0 released March 2005
  - IP Version 6 compatible, discovery/scalability issues
  - NSA is partially funding major players to deliver main devices
  - UA will need 3.0 compliant smaller devices (portable pcm cards, embedded chips, etc.)

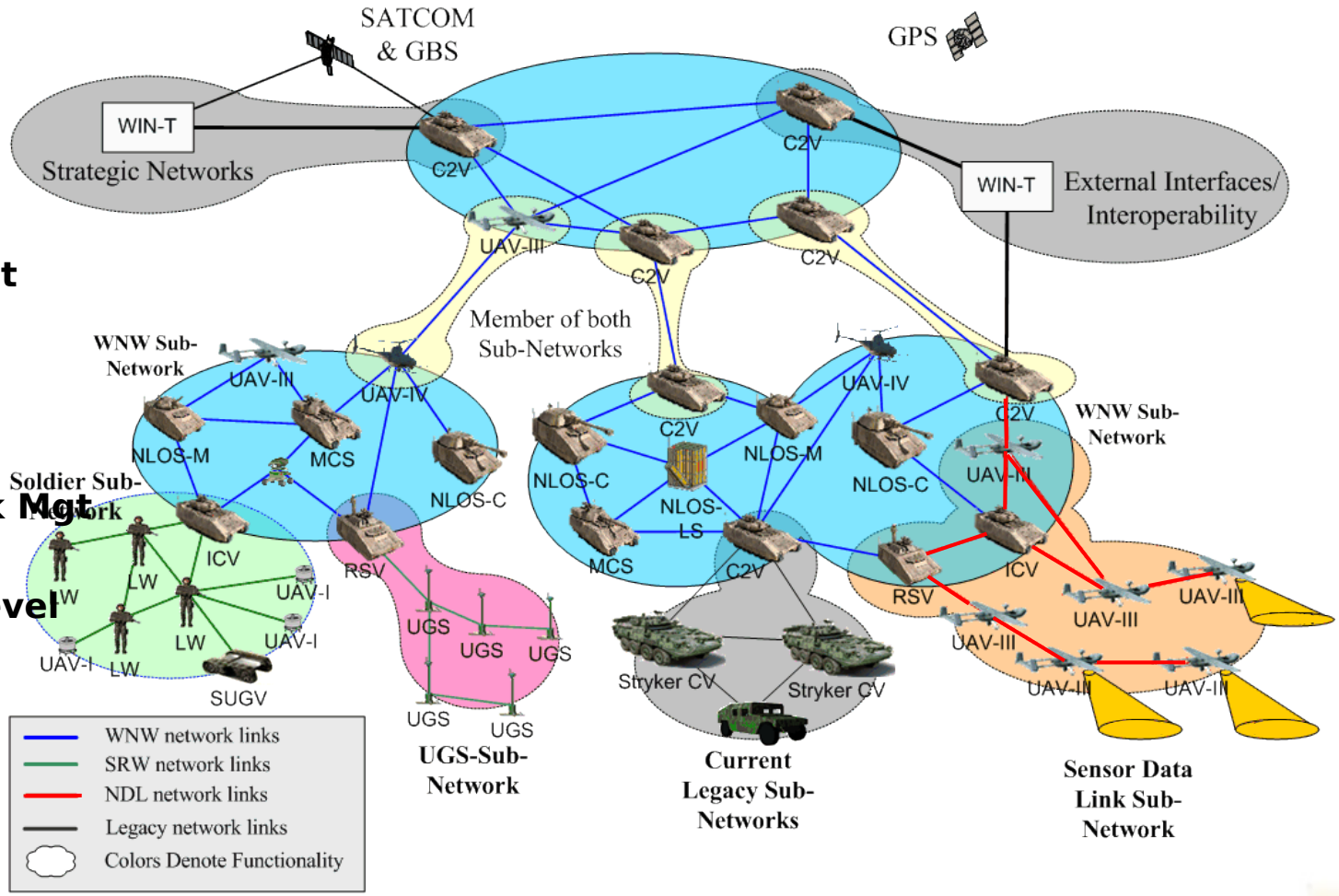

HAIPIS to the End User
PCMCIA Card
HAIPE Radio IMS
Sensor
HAIPIS encryption to defense systems
HAIPIS to the End User
HAIPE Enabled PDA
HAIPE Radio
HAIPIS in the soldier's radio equipment. Connect to the GIG.

Transport Architecture Overview

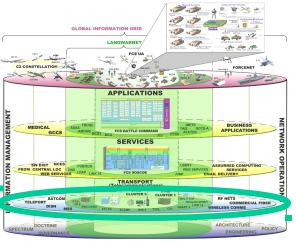


- **Data Transport Services**
- **Scalability**
- **Routing**
- **QoS Enforcement**
- **Network Self-Form/Heal**
- **Mobility**
- **Enhanced SA to Platoon Network Mgt**
- **Fully Networked**
- **BW to Lowest Level**

Joint, Current, Allied, Coalition Interoperability



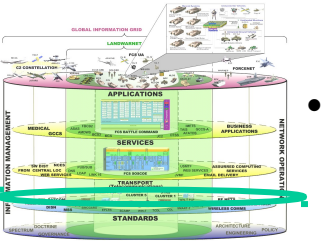
Areas Where Industry Could Benefit
Transport Layer



- Antennas
- RF Filters
- Networking Hardware
- I/O (digital) cables and connectors
- Mechanical Enclosures
- Power Supplies (PCB)
- Engineering Outsourcing

- Advanced Information System Support processors, storage media/controllers, switches/routers, chassis and chassis backplanes
- Software Programmable Radios
- IPv4 to IPv6 Transition
- VOIP applications
- CODEC (coder/decoder)
- Loss concealment techniques for tactical, mobile, ad-hoc environment

Areas Where Industry Could Benefit UA Transport Layer



- **Antennas**
  - **Omni and Directional**
  - **Minimize requirement for multiple antennas on platforms**
  - **Phased array antennas to provide a significant increase in signal strength and throughput**
  - **Instantaneously steered w/o the mechanical and inertial problems of a rotating array**
  - **Provide reduced SWaP**
  - **Defeat jamming threats by nulling jamming signal while steering beam to another user**
  - **Affordable**

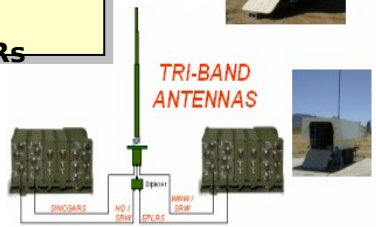
SURVIVABLE LOW PROFILE ANTENNAS

- **Ballistic Survivability**
- **Reduced Visual Signatures**
- **Supporting SBIRs**

BODY WEARABLE ANTENNAS

- **SOLDIER SYSTEM**
- **HELMETS /VESTS**
- **SUPPORTING SBIRs**

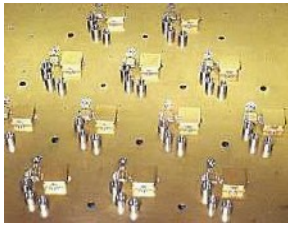
TRI-BAND ANTENNAS



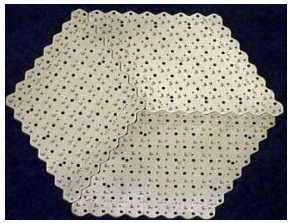
- **3 JTR Waveforms Use 1 Antenna**
- **Diplexer Allow 4th Waveform**
- **SINCGARS, EPLRS, WNW/SRW, HQ**
- **Reduced Antenna Count**
- **Reduced Logistics**

WNW HIGH GAIN ANTENNAS

- **Omni-directional**
- **WNW Link Closure**



Elements in Phase Array Antenna

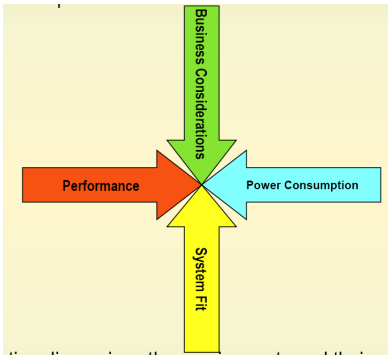


Phase Array Antenna

Areas Where Industry Could Benefit UA Miniaturization

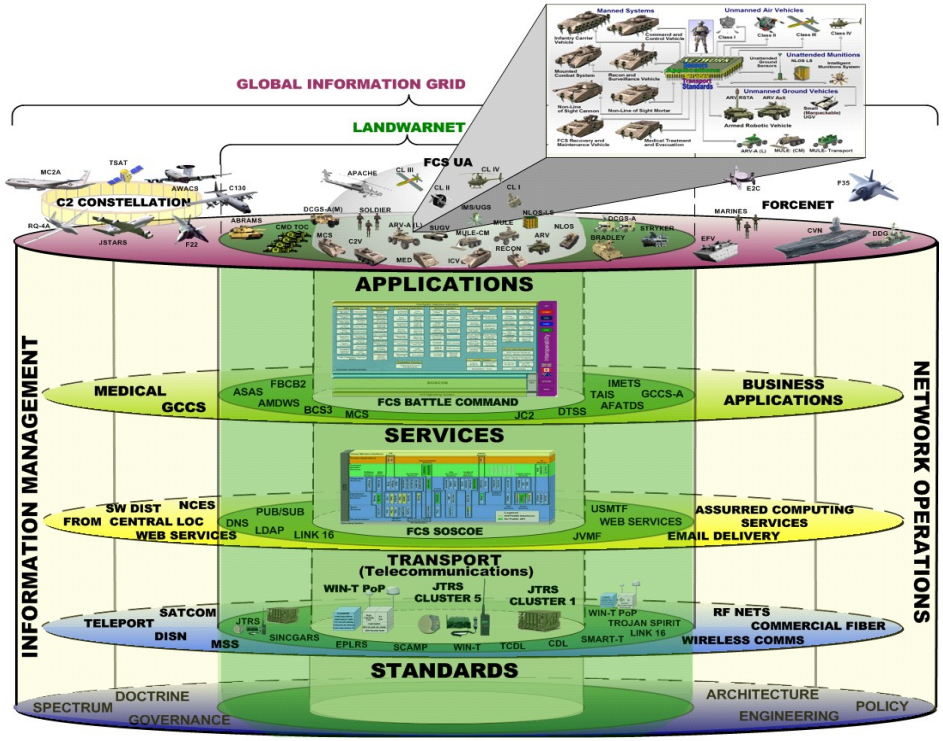
- Loss-less data compression techniques
  - Provide valid imagery, video, and data distribution techniques
  - Recovery and image enhancement mechanisms
  - Miniaturization of Electronic Components
- Affordability of Components
  - Provide manufacturing technology to significantly reduce the cost of providing expendable components
- Manufacturing and technological solutions to reduce the size of component parts reducing overall SWaP
  - More efficient power usage and heat dissipation

- FOPEN TGT
-Sense through wall target detection
- UAV Laser Designation Ranges
- RF Filters
- HAIPE



FCS APBI Summary

- **FCS Program Leverages Risk Management & Significant Technologies.**
- **Many Areas where Industry could Benefit FCS, NSI**



ee First, Understand First, Act First and Finish Decisive